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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/629,815

07/30/2003

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43888-267

9492

7590 03/15/2011  
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EXAMINER

LEE, CYNTHIA K

ART UNIT

PAPER NUMBER

1726

MAIL DATE

DELIVERY MODE

03/15/2011

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/629,815	<b>Applicant(s)</b> OHZUKU ET AL.	
	<b>Examiner</b> CYNTHIA LEE	<b>Art Unit</b> 1726	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 28 December 2010.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1,3-9,14 and 16-19 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,3-9,14 and 16-19 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                       | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | Paper No(s)/Mail Date. _____                                      |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____  | 6) <input type="checkbox"/> Other: _____                          |

***Response to Amendment***

This Office Action is responsive to the arguments filed on 12/28/2010. Claims 1, 3-9, 14, 16-19 are pending.

Applicant's arguments have been considered. Claims 1, 3-9, 14, 16-19 are finally rejected for reasons stated herein below.

***Information Disclosure Statement***

The Information Disclosure Statements (IDS) filed 10/25/2010 have been placed in the application file and the information referred to therein has been considered.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1, 3-8, 14, 16-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ohzuku (Layered Lithium Insertion Material of  $\text{LiCo}_{1/3}\text{Ni}_{1/3}\text{Mn}_{1/3}\text{O}_2$  for Lithium-Ion Batteries, Chemistry Letters 2001, the Chemical Society of Japan, pgs 642-643, CL-010390) in view of Wada (US 5866279).

Ohzuku '390 discloses a positive electrode material comprising the formula  $\text{LiCo}_{1/3}\text{Ni}_{1/3}\text{Mn}_{1/3}\text{O}_2$  (see Abstract).

Ohzuku '390 does not expressly disclose the twining structure of the above formula as claimed by the Applicants in claims 1, 3, 4 and 6-8.

The instant Specification pg 49-50 states regarding Example 1-1 and Example 1-2: "These materials were found by TEM image and electron beam diffraction as above to have signals exhibiting a twining portion and a superlattice arrangement within the particle."

The instant Specification pg 50 states regarding Comparative Example 1: "The material was examined by TEM image and electron beam diffraction, finding no signal indicating a twining portion and a superlattice."

As outlined in Table 4 (pg 52 of the Specification), the difference between Ex 1-1 and 1-2, and Comparative Ex 1 is that Ex 1-1 and 1-2 were formed with rapid heating and quenching, and Comparative Ex 1 was formed without rapid heating and quenching. Thus, it is noted that twining structure is formed by rapid heating and quenching the active material.

The instant Specification pg 28, 1<sup>st</sup> par. states that:

"Basically, rapid heating and quenching are performed in the present invention. It is preferred that rapid heating be performed at a rising temperature rate of not less than 7 °C /min and quenching be performed at a cooling rate of not less than 5 °C/min. Thereby, it is possible to control the grains within the primary particle as stated above. It is presumed that, when quenching is performed, oxygen loss occurs. Accordingly, it is preferred to perform heating treatment again at 700 to 750°C in an air atmosphere"

Ohzuku '390 does not disclose that the nickel, manganese, and cobalt elements are uniformly dispersed at the atomic level (Applicant's claim 1). It is noted that that elements are dispersed at the atomic level by using the coprecipitation method to produce positive electrode material. The instant Specification pg 24 states that:

“First, the coprecipitation in step (a) is the method primarily to obtain a composite hydroxide by simultaneously coprecipitating a plurality of elements in an aqueous solution through neutralization reaction. In the case of using nickel, manganese and cobalt, since manganese is prone to be oxidized, manganese is sufficiently oxidized into trivalent manganese ions even by a trace amount of dissolved oxygen present in the aqueous solution. As a result, its dispersion and formation of solid solution at the atomic level is insufficient. The point of this step is to produce a double hydroxide or triple hydroxide by allowing nickel, manganese and cobalt elements to be present in one layered hydroxide without separation.” (emphasis added)

Wada teaches of forming a lithium manganese oxide by using coprecipitation method. The oxides of the raw materials were mixed in solution and were allowed to coprecipitate. The coprecipitated powder was calcined to obtain the lithium manganese oxide. The obtained coprecipitated powder was calcined to obtain  $\text{LiMn}_{0.5}\text{O}_2$ . The calcining conditions were such that firstly thermal decomposition was carried out in atmospheric air at a temperature of 400.degree. C. for 6 hours at a temperature-raising rate of 5.degree. C./min, then calcination was carried out in atmospheric air at a temperature of 750.degree. C. for 24 hours at a temperature-raising rate of 5.degree. C./min (Applicant's rapid heating), and thereafter gradual cooling to 450.degree. C. was carried out at a rate of 0.2.degree. C./min, and then the product was maintained for 6 hours, and then cooled to a room temperature at a rate of 5.degree. C./min (Applicant's rapid quenching). It would have been obvious to one of ordinary skill in the art at the time the invention was made to form the lithium metal oxide of Ohzuku by coprecipitation with heating and cooling, as taught by Wada, since all the claimed elements were known in the prior art and one skilled in the art could

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have combined the elements as claimed by known methods with no change in their respective functions, and the combination would have yielded predictable results to one of ordinary skill in the art at the time of the invention. See *KSR v. Teleflex*, 127 S.Ct. 1727 (2007).

The formation the Ohzuku's positive electrode material using the coprecipitation method with rapid heating and quenching inherently forms nickel, manganese, and cobalt elements being "uniformly dispersed at the atomic level" and the "twining portion" as claimed by Applicants in claim 1.

It is noted that Wada's temperature-raising rate of 5.degree.C./min reads on Applicant's "rapid heating".

A reference which is silent about a claimed invention's features is inherently anticipatory if the missing feature *is necessarily present in that which is described in the reference*. In re Robertson, 49 USPQ2d 1949 (1999). The courts have held that claiming of a property or characteristic which is inherently present in the prior art does not necessarily make the claim patentable. In re Best, 562 F.2d 1252, 1254, 195 USPQ 430, 433 (CCPA 1977). See MPEP 2112 and 2112.01.

When the Examiner has provided a sound bases for believing that the products of the applicant and the prior art are the same, the burden of proof is shifted to the applicant to prove that the product shown in the prior art does not possess the characteristics of the claimed product. In re Spada, 911 F.2d 705, 709, 15 USPQ2d 1655, 1658 (Fed. Cir. 1990).

Regarding claim 14, Ohzuku '390 discloses a  $\text{LiCo}_{1/3}\text{Ni}_{1/3}\text{Mn}_{1/3}\text{O}_2$  electrode, but does not disclose a negative electrode material capable of absorbing and desorbing lithium ions and/or metal lithium and an electrolyte. Wada teaches a negative electrode material capable of absorbing and desorbing lithium ions (6:25-34) and an electrolyte (7:7-9). It would have been obvious to one of ordinary skill in the art at the time the invention was made to add a negative electrode material capable of absorbing and desorbing lithium ions and/or metal lithium and an electrolyte to the positive electrode material of Ohzuku '390 for the benefit of generating electrical power.

Regarding Applicant's claim 19, Wada teaches a cooling rate of 5.degree.C./min, not 7.degree.C./min. It has been held that a prima facie case of obviousness exists where the claimed ranges and prior art ranges do not overlap but are close enough that one skilled in the art would have expected them to have the same properties. *Titanium Metals Corp. of America v. Banner*, 778 F.2d 775, 227 USPQ 773 (Fed. Cir. 1985). See MPEP 2144.05. Generally, differences in concentration or temperature will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such concentration or temperature is critical. "[W]here the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation." *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955). MPEP 2144.05

Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ohzuku (Layered Lithium Insertion Material of  $\text{LiCo}_{1/3}\text{Ni}_{1/3}\text{Mn}_{1/3}\text{O}_2$  for Lithium-Ion Batteries,

Chemistry Letters 2001, the Chemical Society of Japan, pgs 642-643, CL-010390) in view of Wada (US 5866279) as applied to claim 1 above, and further in view of Miyasaka (US 6416902).

Ohzuku '390 modified by Wada teaches particles but does not disclose primary particles and secondary particles as claimed in Applicant's claim 9. However, Miyasaka discloses a lithium ion battery comprising a positive electrode with a mean grain size in the range of 3 to 15  $\mu\text{m}$  for secondary particles and in the range of 0.1 to 0.5  $\mu\text{m}$  for primary particles. The term secondary particle means a particle consisting of aggregated primary particles (5:48-57). Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have primary and secondary particles as taught by Miyasaka in the particles of Ohzuku '390 modified by Wada for the benefit of packing the primary particles between the secondary particles. It is noted that primary particles will be able to occupy void spaces between the secondary particles, and hence minimize void spaces.

### ***Response to Arguments***

The Response filed 12/28/2010 has been considered. The three points outlined on pg 10 of the Response is addressed below:

(1) The Examiner agrees with the Applicant that the twining portions are formed by rapid heating and cooling. See rejection above.

(2) It is noted that Ohzuku discloses a lithium transition metal oxide composite of nickel, manganese, and cobalt. Wada teaches the coprecipitation of lithium and manganese. It is noted that the combination of Ohzuku and Wada would entail



coprecipitating the metal oxides/hydroxides of lithium, nickel, manganese, and cobalt of Ohzuku because Wada teaches the coprecipitation of the metal compounds.

(3) It is noted that the coprecipitation method does not form a particular crystal structure. It is noted that the coprecipitation method can be applied to various crystal structures, and not only for spinel structures. Wada does not use the coprecipitation method for the purpose of forming the spinel structure of lithium manganese oxide.

Because the coprecipitation method can be applied irrespective of the crystal structure of the active material, combining the elements as claimed by known methods with no change in their respective functions would have been within the skill of an ordinary artisan because the combination would have yielded predictable results of forming a lithium composite oxide. See *KSR v. Teleflex*, 127 S.Ct. 1727 (2007).

*Applicant asserts that, in the present invention, the lithium is added to Mn/Ni/Co crystal structure after the three transition metal matrix is formed. Thus, the lithium is not tightly bound to the crystal structure backbone, and can easily enter into and exit from the crystal interstices during charge/discharge. In addition, Wada et al. teach (col. 3, lines 35-37), "[t]he lithium manganese oxide of the present invention is the one obtained by a special combination of specific starting materials and a specific production process," thus, Wada et al. teach away from the disclosed coprecipitation being generally applicable to the formation of a three-transition metal-containing, layered crystal structure.*

In response, the claims do not require that the lithium be separately mixed after the three transitions metal mix. The formation the Ohzuku's positive electrode material using the coprecipitation method with rapid heating and quenching inherently forms nickel, manganese, and cobalt elements being "uniformly dispersed at the atomic level" and the "twining portion" as claimed by Applicants in claim 1. When the Examiner has provided a sound bases for believing that the products of the applicant and the prior art are the same, the burden of proof is shifted to the applicant to prove that the product shown in the prior art does not possess the characteristics of the claimed product. In *re Spada*, 911 F.2d 705, 709, 15 USPQ2d 1655, 1658 (Fed. Cir. 1990).

### ***Conclusion***

**THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to CYNTHIA LEE whose telephone number is (571)272-8699. The examiner can normally be reached on Monday-Friday 8:30am-5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached on 571-272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Cynthia Lee/  
Examiner, Art Unit 1795